Digital Braille Watch

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Abstract

The goal of our project is to create a digital Braille watch that displays 24-hour time, does not cause disruptions to others, and is robust. The Braille display must be appropriately sized so that the user can accurately and reliably distinguish between the different digits displayed. The current prototype incorporates vibrotactile motors controlled via Delphi 5. Ultimately, the final design will interface a clock chip with the tactile display.

Background

• Current watches
  - Speaking watches
  - Tactile analog watches
• Disruptively noisy
• Prone to misreading
• No current commercialized digital Braille watches
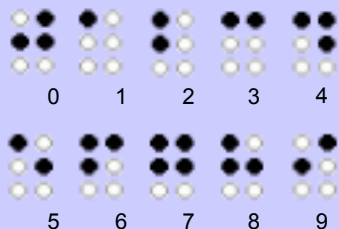• Patent pending

Figure 1: Analog Braille watch. [1]

Figure 2: The Braille representation of numbers. [2]

Design Specifications

• Silent
• 24-hour time display
• Time displayed in Braille
• Display size of wristwatch or pocket watch

Current Prototype

• Interfaces program (Delphi 5) with display
  - Displays 24-hour time in Braille
  - Scrolls through each time digit in sequence
  - All dots activated – signals start of sequence
  - No dots activated – off or pause between digit
• Vibrotactile display
  - 4 shaftless vibration motors
  - Requires 2 V, 0.1 A
  - Motors connected in parallel
  - LEDs in parallel with motors

Figure 3: Solidworks model of ideal vibrotactile display.

Figure 4: Circuitry components of prototype. The LEDs show visually which motors are activated.
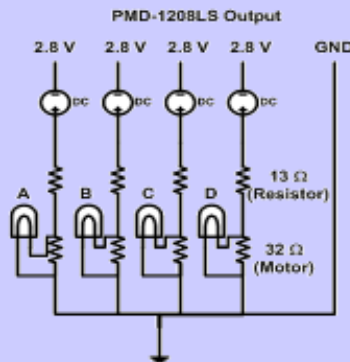
Testing and Results

• Voltage threshold for motors – 0.7 V
• Two point discrimination
  - Distance of 12 mm from center to center
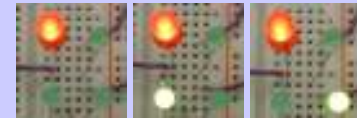 - Threshold – 1 V

Figure 5: LED test display showing Braille numbers 1, 2, and 5.

Figure 6: Shaftless vibration motor [3]

Figure 7: Two point discrimination testing with motor

Future Work

• Establish quantitative data for two-point discrimination
• Improve packaging of device
  - Incorporate clock chip
  - Optimize vibration of motors
  - Determine ideal power source

References

[1] http://www.geocities.com/Eureka/Concourse/3294/cortblind.jpg
[2] http://www.mathsisfun.com/braille-translation.html
[3] http://www.sparkfun.com/commerce/product_info.php?products_id=8449

Acknowledgements